

The matrix glass is melted, clarified and homogenized in a crucible, into which the light-storage self-luminescent material is added. Then the system is mixed well using a 1Cd18Ni9Ti rod, secondarily clarified, and pressed into an integrally luminous glass ashtray.

After being illuminated under sunshine or lamplight for 10 min, the obtained ashtray can self-emit blue-green light in the dark for over 8 hrs.

The above process can also be applied to the light-storage self-luminescent materials 1, 2 and 4 having a particle size of from 30 to 80  $\mu\text{m}$  for press forming light-storage self-luminescent glass articles in various shapes.

#### Example 9

Starting materials: low melting point glass comprising (wt%):

SiO<sub>2</sub>: 29%                      Al<sub>2</sub>O<sub>3</sub>: 1%

B<sub>2</sub>O<sub>3</sub>: 33%                      Li<sub>2</sub>O: 5%

Na<sub>2</sub>O: 9%                      TiO<sub>2</sub>: 17%

CaO: 5%                      SrO: 1%;

Light-storage self-luminescent material 2 (Sr<sub>2</sub>MgSi<sub>2</sub>O<sub>7</sub>:Eu<sub>0.05</sub>Dy<sub>0.05</sub>) having a particle size of from 30 to 50  $\mu\text{m}$ .

The low melting point glass is melted, cooled down and crushed to obtain 250-mesh glass powder. 80 g of the glass powder is mixed well with 20 g of the light-storage self-luminescent material and then the resultant mixture is melted at 850-900°C for 1.5 h in an air atmosphere in a furnace, moulded and annealed to obtain light-storage self-luminescent glass.

After being illuminated under sunshine or lamplight for 10 min, the obtained light-storage self-luminescent glass can self-emit blue light in the dark for over 10 hrs.

The above process can also be applied to the light-storage self-luminescent glass material 5.

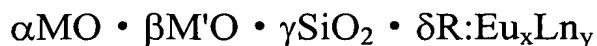
The light-storage self-luminescent glass obtained in the above process can be subject to deep processing such as knifing, cutting, drilling, polishing and grinding.

What we claim is:

1. Light-storage self-luminescent glass, comprising from 0.01% to 40% by weight of a light-storage self-luminescent material activated by multiple ions and from 99.99% to 60% by weight of a matrix glass; wherein the light-storage self-luminescent material has a particle size from 10  $\mu\text{m}$  to 20 mm, and the matrix glass is low melting point glass or common silicate glass, and other conventional borate glass, phosphate glass, halide glass, sulfide glass and aluminate glass.

2. Light-storage self-luminescent glass according to claim 1, wherein the chemical formula of the light-storage self-luminescent material activated by

multiple ions is:



wherein M is one or more selected from the group consisting of Sr, Ca, Ba and Zn;

M' is one or more selected from the group consisting of Mg, Cd and Be;

R is  $\text{B}_2\text{O}_3$ ,  $\text{P}_2\text{O}_5$  or mixture thereof;

Ln is one or more selected from the group consisting of Nd, Dy, Ho, Tm, La, Pr, Tb, Ce, Er, Mn, Bi, Sn and Sb; and

$\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $x$  and  $y$  are molar coefficients meeting following requirement:  $0.6 \leq \alpha \leq 6$ ;  $0 \leq \beta \leq 5$ ;  $1 \leq \gamma \leq 9$ ;  $0 \leq \delta \leq 0.7$ ;  $0.00001 \leq x \leq 0.2$ ;  $0 \leq y \leq 0.3$ .

3. Light-storage self-luminescent glass according to claim 2, wherein the main chemical formula of the light-storage self-luminescent material activated by multiple ions is:

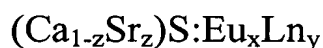


wherein Ln is one or more selected from the group consisting of La, Ce, Dy, Tm, Ho, Nd, Er, Sb and Bi;

$z$  is a coefficient:  $0 \leq z \leq 1$ ; and

x and y are molar coefficients:  $0.0001 \leq x \leq 0.2$ ;  $0.0001 \leq y \leq 3.0$ .

4. Light-storage self-luminescent glass according to claim 1, wherein the chemical formula of the light-storage self-luminescent material activated by multiple ions is:



wherein Ln is one or more selected from the group consisting of Er, Dy, La, Tm and Y;

z is a coefficient:  $0 \leq z \leq 1$ ; and

x and y are molar coefficients meeting following requirement:  $0.00001 \leq x \leq 0.2$ ;  $0.00001 \leq y \leq 0.15$ .

5. Light-storage self-luminescent glass according to claim 1, wherein the chemical formula of the light-storage self-luminescent material activated by multiple ions is:

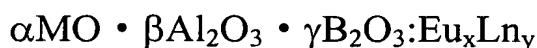


wherein R is one or more selected from the group consisting of Y, La and Gd;

Ln is one or more selected from the group consisting of Er, Cr, Bi, Dy, Tm, Ti, Mg, Sr, Ca, Ba and Mn; and

x and y are molar coefficients meeting following requirement:  $0.00001 \leq x \leq 0.2$ ;  $0.00001 \leq y \leq 0.6$ .

6. Light-storage self-luminescent glass according to claim 1, wherein the chemical formula of the light-storage self-luminescent material activated by multiple ions is:

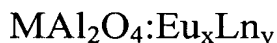


wherein M is one or more selected from the group consisting of Mg, Ca, Sr and Zn;

Ln is one or more selected from the group consisting of Nd, Dy, Ho, Tm, La, Ce, Er, Pr and Bi; and

$\alpha$ ,  $\beta$ ,  $\gamma$ , x and y are molar coefficients meeting following requirement:  $0.5 \leq \alpha \leq 6$ ;  $0.5 \leq \beta \leq 9$ ;  $0 \leq \gamma \leq 0.3$ ;  $0.00001 \leq x \leq 0.15$ ;  $0.00001 \leq y \leq 0.2$ .

7. Light-storage self-luminescent glass according to claim 6, the chemical formula of the light-storage self-luminescent material is:

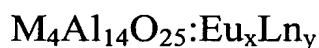


wherein Ln is one or more selected from the group consisting of La, Ce, Dy, Ho, Nd and Er;

M is one or more selected from the group consisting of Sr, Ca, Mg and Zn; and

x and y are molar coefficients:  $0.0001 \leq x \leq 0.15$ ;  $0.0001 \leq y \leq 0.2$ .

8. Light-storage self-luminescent glass according to claim 6, wherein the chemical formula of the light-storage self-luminescent material activated by multiple ions is:



wherein Ln is one or more selected from the group consisting of Pr, Ce, Dy, Ho, Nd and Er;

M is one or more selected from the group consisting of Sr, Ca, Mg and Zn; and

x and y are molar coefficients:  $0.0001 \leq x \leq 0.15$ ;  $0.0001 \leq y \leq 0.2$ .

9. Light-storage self-luminescent glass according claim 1, wherein the low melting point glass consists of following components (by weight):

SiO<sub>2</sub>: 10-45%

MgO: 0-8%

Al<sub>2</sub>O<sub>3</sub>: 1-5%

CaO: 2-10%

B<sub>2</sub>O<sub>3</sub>: 0-50%

SrO: 1-10%

Li<sub>2</sub>O: 0-6%

BaO: 0-7%

Na<sub>2</sub>O: 5-20%

ZnO: 0-10%

$K_2O$ : 0-20%

$ZrO_2$ : 0-1%

$TiO_2$ : 0-20%.

10. Light-storage self-luminescent glass according claim 1, wherein the conventional silicate glass consists of following components (by weight ):

$SiO_2$ : 30-81%

$CaO$ : 0.5-9%

$Al_2O_3$ : 0-23%

$MgO$ : 1-8%

$B_2O_3$ : 0-15%

$SrO$ : 1-10%

$Li_2O$ : 0-8%

$BaO$ : 0-16%

$Na_2O$ : 0.6-18%

$ZnO$ : 0.6-55%

$K_2O$ : 0.4-16%

$PbO$ : 0-33%

$As_2O_3$ : 0-0.5%.

11. A process for producing the light-storage self-luminescent glass according to claim 1, comprising formulating, mixing, melting and forming to obtain the light-storage self-luminescent glass.

12. A process for producing the light-storage self-luminescent glass according to claim 11, wherein the light-storage self-luminescent material is doped into the melted matrix glass to produce a mixture and the mixture is

formed at 900-1300°C during the forming process.

13. A process for producing the light-storage self-luminescent glass according to claim 11, wherein a glass which has been formed and cooled is re-heated and melted by a glass blower, and doped with the light-storage self-luminescent material before secondary forming.

14. A process for producing the light-storage self-luminescent glass according to claim 11, wherein the matrix glass is melted, homogenized and clarified to obtain a glass metal, the resultant glass metal is doped with 1-45% of a light-storage self-luminescent material to produce a mixture, and the mixture is mixed well and then secondarily clarified before forming.

15. A process for producing the light-storage self-luminescent glass according to claim 11, wherein the low melting point glass is melted, cooled down and crushed to obtain glass powder; the glass powder is thoroughly mixed with a light-storage self-luminescent material to obtain a mixture; and then the resultant mixture is heat treated at the temperature of 700-1100°C to obtain the light-storage self-luminescent glass.